

**RE-DESCRIPTION OF *CALAPPA EXANTHEMATOSA* ALCOCK
AND ANDERSON, 1894 (CRUSTACEA: DECAPODA:
CALAPPIDAE) FROM THE COASTAL WATERS OF PAKISTAN**

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ABSTRACT: The box crab *Calappa exanthematosa* Alcock and Anderson, (1894) re-described from the coastal waters of Pakistan. *C. exanthematosa* was collected as a bycatch during the shrimp trawling. This species previously synonymised under *C. japonica* Ortmann, (1892) from the Bay of Bengal, (type locality Japan), since 1937 to till date (Galil, 1997; Spiridinov and Apel, 2007). Ng *et al.*, (2011) re-described and illustrated the *C. exanthematosa* after comparison of freshly collected specimen of *Calappa japonica* from the Gulf of Oman and India and revealed that the both species have resemblance to each other, but few marked differences exist between both species. Current study re-described the morphological characteristic of *C. exanthematosa* from the coastal waters of Pakistan.

KEYWORDS: *Calappa exanthematosa*; re-description; Karachi; Pakistan; Calappidae

INTRODUCTION

Superfamily Calappoidea De Haan, (1833), Family Calappidae De Haan, (1833) composed of nine genera including *Acanthocarpus* Stimpson, (1871), *Calappa* Weber, (1795), *Calappula* Galil, (1997), *Cryptosoma* Brullé, (1837), *Cycloes* De Haan, (1837), *Cyclozodion* Williams and Child, (1990), *Mursia* Desmarest, (1823), *Paracyclois* Miers, (1886), *Platymera* H. Milne Edwards, (1837). One of the representatives' genera of Family Calappidae *Calappa* Weber, (1795) includes forty species (Ng, 2008). Previously only two species report from the coastal waters of Pakistan as described by Tirmizi and Kazmi, (1996) *Calappa lophos* and *Calappa gallus*. According to Ng *et al.*, (2011) *C. exanthematosa* synonymized as *C. japonica* Ortmann, (1892) (type locality Japan), since Sakai, 1937 to till date (Galil 1997 and Spiridinov and Apel 2007). Although Alcock and Anderson, (1894) earlier described *Calappa exanthematosa* based on two males and three females from the Bay of Bengal (Alcock and Anderson 1894: 177; Alcock 1896: 146). Ng *et al.*, (2011) resolved this confusion after examine the fresh specimens of "*Calappa japonica*" from the Gulf of Oman and revealed the number of differences i.e. live colour, carapace (general form, shape of lateral teeth, position of longitudinal gastro-cardiac grooves, structures of posterior region), pterygostomian lobe, chela, male abdominal somite 6, male telson and G1 was observed between these two distinct species and remove *C. exanthematosa* from the synonymy of *C. japonica*, and reinstate it as a distinct species and declared that the *C. exanthematosa* Alcock and Anderson, (1894), as a valid species of box crab from the Indian Ocean.

One male specimen of *C. exanthematosa* (ZMUC Cru 1846) previously reported from Makran coast of Pakistan (Hansen, 1963), nevertheless the current study explain the occurrence and range extension of *C. exanthematosa* and describe the morphological diagnostic characteristics of re described species with some modification (Ng *et al.*, 2011).

MATERIALS AND METHOD

Calappa exanthematosa was collected on 29th October 2019 from the Karachi fish Harbor as a bycatch along with other deep sea species during bottom shrimp trawling from sandy, muddy or shelly bottom. The *C. exanthematosa* is immediately frozen, and preserved in 10% formalin and transferred to 70% ethanol for morphological examination and long-term storage for museum record. The specimen identified based on morphological characteristics according to the recognized available taxonomic key Ng *et al.* (2011). The specimen is also in process and subjected to ongoing molecular (DNA barcode) study. Morphometric measurements were made for thirteen variables, i.e. Carapace length, Carapace width, Anterolateral border, Posterolateral border, Posterior margin, Chela length, Chela width, Chela height, Carpus length, Carpus width, Merus length, Merus width, Abdominal length and total weight. Vernier callipers with an accuracy of 0.5 mm were used for length measurements, and the total weight of the crab was determined to the nearest gram using a digital balance (0.1 g).

Systematics:

Superfamily Calappoidea De Haan (1833)

Family Calappidae De Haan (1833) [Opinion 712]

Genera Calappa Weber (1795)

Species Calappa exanthematosa Alcock & Anderson (1894)

Taxonomic history of *Calappa exanthematosa* Alcock and Anderson (1894)

Alcock and Anderson, 1894, stat. nov.

Alcock and Anderson (1894): 177

Alcock (1896): 146

Ng *et al.* (2011)

Systematic History *Calappa exanthematosa* Alcock and Anderson (1894)

Calappa exanthematosa Alcock and Anderson (1894): 177; Alcock and Anderson (1895): pl. 15 Figs. 1, 1a; Alcock (1896): 146.

Calappa exanthematosa Alcock and Anderson (1894), stat. nov.

Alcock and Anderson (1894): 177; Alcock 1896: 146; Ng *et al.*, 2011: Figs. 1, 2, 4, 5B, 6B, 7B, 8C, D, 9D-F.

Calappa japonica Spiridonov and Apel (2007): 2853, fig. 1A, B; Ng *et al.* (2008): 48 (list) (part) (not *Calappa japonica* Ortmann, 1892).

Calappa cf. *pustulosa*-Türkay (1986): 150 (not *Calappa pustulosa* Alcock, 1896).

Size: *Calappa exanthematosa* one male: Morphometric measurements were made for thirteen variables described (Table 1)

Color: Maroon spots on posterior half of carapace, not connected, demarcated by cream area around each appeared distinctly spotted (Fig. 2).

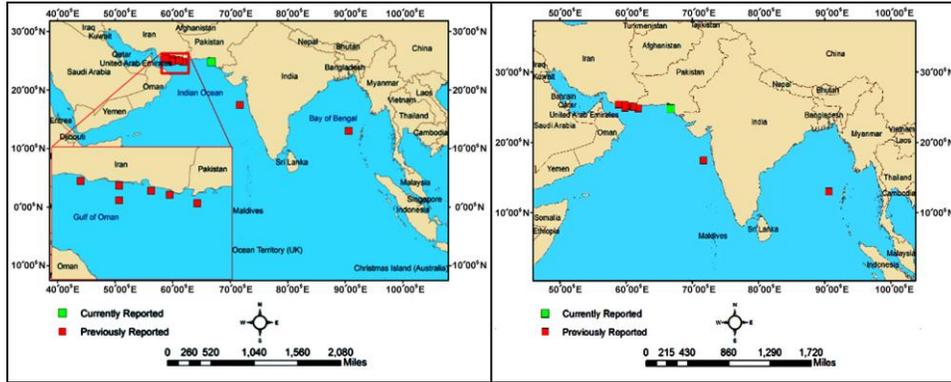


Fig. 1. Distribution range and map of *Calappa exanthematos* Alcock and Anderson, (1894).

Table 1. Morphometric measurements of *C. exanthematos* collected from the coastal waters of Pakistan.

Variables	Measurements
Carapace length	75 mm
Carapace width	110mm
Anterolateral border	70mm
Posterolateral border	54mm
Posterior margin	20mm
Chela Length	68mm
Chela width	46mm
Chela height	18mm
Carpus length	41 mm
Carpus width	21 mm
Merus length	45 mm
Merus width	2.5 mm
Abdominal length	4.5 mm

Table 2. Reported geographical distribution range of *C. exanthematos*.

Material examined Ng <i>et al.</i> , (2011)	Distribution range
India: Bay of Bengal	13°01'06"N, 90°36'56" E
West coast of Indian Subcontinent	17°27'N, 71°41' E
Iran Gulf of Oman	25°08'–25°10'N, 60°27'–60°59' E ,
Chabahar Bay	25°15'–25°20'N, 59°10'–60°20' E
Ghot- beddin	25°00'–25°06'N, 61°06'–61°11' E,
Ghot beddin	24°51'–24°59'N, 59°10'60°20' E =
Pasa bandar	25°20'–25°27'N, 58°42'58°55' E
Pakistan: Makran	24°50'N, 61°52' E

Habitat: Found in soft sandy bottoms, at a depth range in between 13-46 meters in Gulf of Oman Iran and 56-58 fathoms in West coast of Indian Subcontinent (Ng *et al.*, 2011).

Distribution: India: Bay of Bengal, West coast of Indian Subcontinent, Pakistan, and Iran: Gulf of Oman (Chabahar Bay, Got-beddin, Pasabander), Current study Karachi, Pakistan (Fig. 1, Table 2).

Diagnostic characters (Fig. 2 – Fig. 7): Ng *et al.*, (2011) briefly re-described and demonstrated the diagnostic characters of *C. exanthematosus*. Some diagnostic morphological features are here present with some modification following Ng *et al.*, (2011). Freshly collected specimen have yellow tubercles encircled by maroon coloration, the spot pattern on the posterior region of the carapace is slightly changed and separated in the form of maroon spots delineate cream area around each spot without any trace of a reticulate pattern, not connected, distinctly spotted. Dorsal surface of carapace moderately more swollen, distinct irregular row of tubercles exist behind posterior margin of carapace, forming shallow but distinct longitudinal deep gastro-cardiac grooves lined by small granules, moderately closed space found in between gastro-cardiac grooves. Lateral teeth of carapace consistently triangular in adult's specimen, with tip level with rest of tooth.

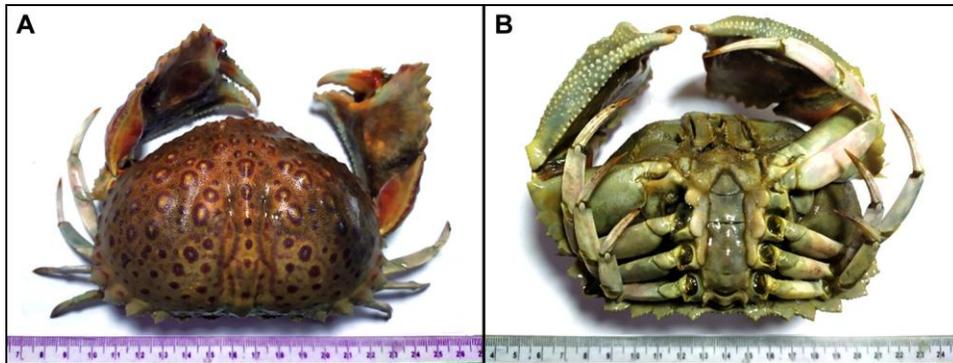


Fig. 2. *Calappa exanthematosus* Alcock and Anderson, 1894: A, Dorsal view; B, ventral view.

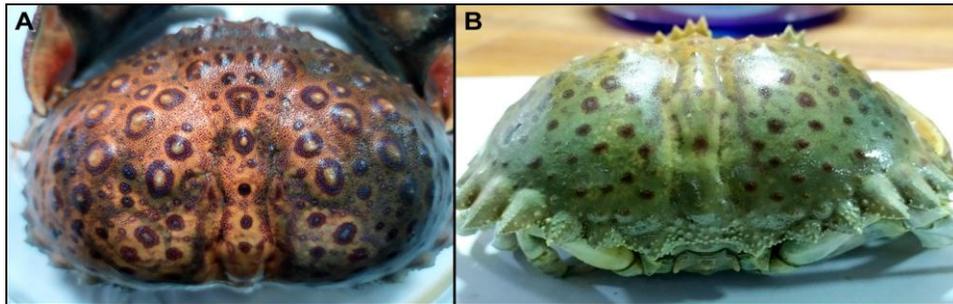


Fig. 3. A, Carapace dorsal view showing groove; B, Posterior view of carapace.

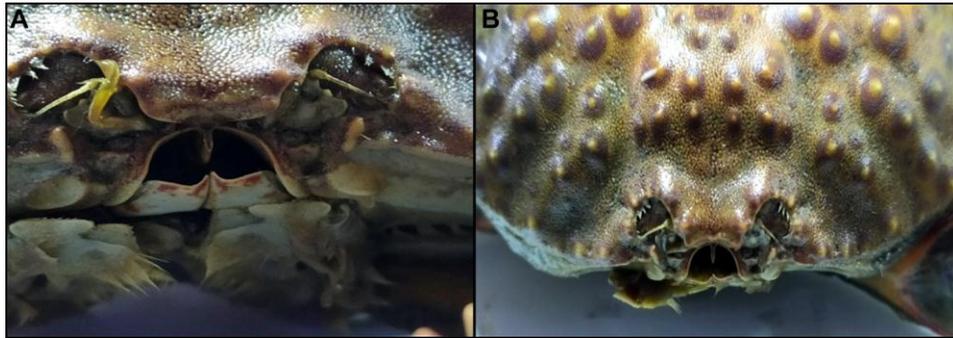


Fig. 4. A, Frontal view of Carapace showing pterygostomian lobe; B, Frontal view.

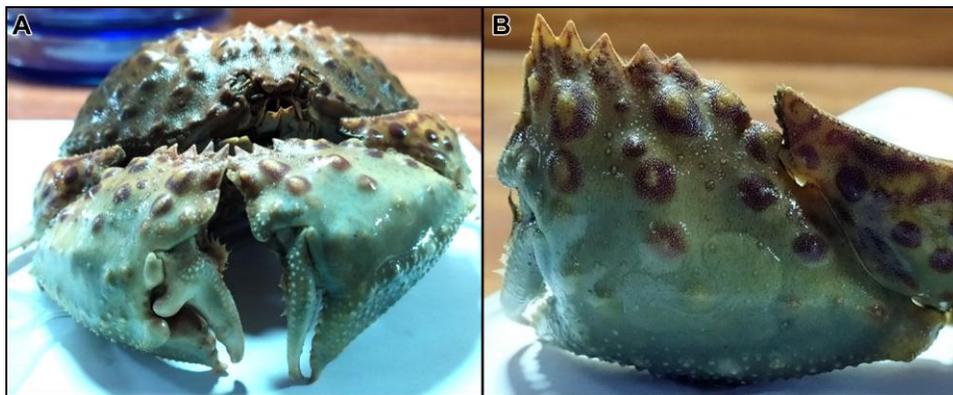


Fig. 5. A, Carapace with chela; B, Outer view of chela.

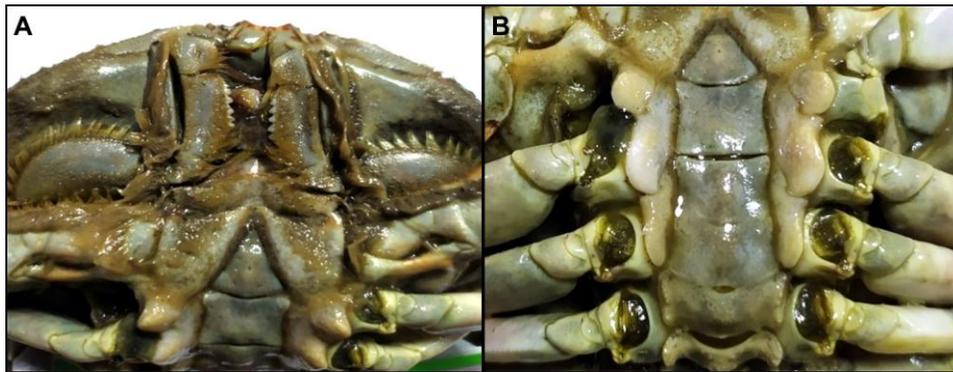


Fig. 6. A, Maxillipeds; B, Male abdominal Somite 6 and Telson.

The rounded tubercles line the frontal and orbital margins in *C. exanthematos*. Pterygostomian inner lobe oblique, longitudinal groove narrow, ventral surface of chelipeds manus with relatively more prominent scattered rounded granules and

tubercles; ventral margin lined with numerous granules which are spaced further apart, Male thoracic sternites 4–6 relatively lower, broader, Median tubercles on abdominal somite's 2–4 relatively low and flat. Male 6th abdominal somite rectangular, broader than long, male telson relatively more elongate with distal third tapering sharply, G1 More strongly curved, distinctly C-shaped; tip sub truncate to gently round. The structure of the pterygostomian lobe situated at the lateral edge of the posterior margin of the epistome and is part of the anterolateral margin of the buccal cavity. In *Calappa* species, it takes the form of an oblique lobe with two obliquely parallel grooves, the inner one being relatively broader. The inner groove of this lobe is less broad in *C. exanthematos*. Particularly in the shape of 6th somite and telson proportionately longer.

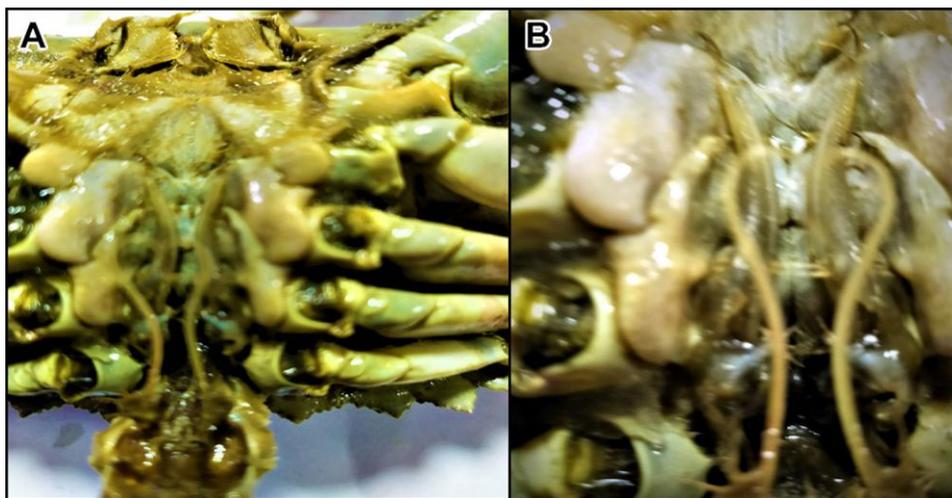


Fig. 7. A, Gonopod; B, gonopod further enlarge.

Taxonomic remarks: Ng *et al.*, 2011 described *C. exanthematos* Alcock & Anderson, (1894), (box crab) as a valid species from the Indian Ocean after the comparison in between *C. japonica* Ortmann, (1892) and *C. exanthematos* and revealed that the these two taxa (*C. exanthematos* and *C. japonica*) obviously discriminate to each other on the basis of differences in morphological characteristic (live colour, carapace (general form, shape of the lateral teeth, position of the longitudinal gastro-cardiac grooves, structures of the posterior region), pterygostomian lobe, ventral margin of the chela, male 6th abdominal somite, male telson and G1) and reinstate *C. exanthematos* as a distinct species.

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